

A NEW CRAYFISH OF THE GENUS PROCAMBARUS FROM
GEORGIA WITH A KEY TO THE SPECIES
OF THE CLARKII SUBGROUP¹

(Decapoda, Astacidae)

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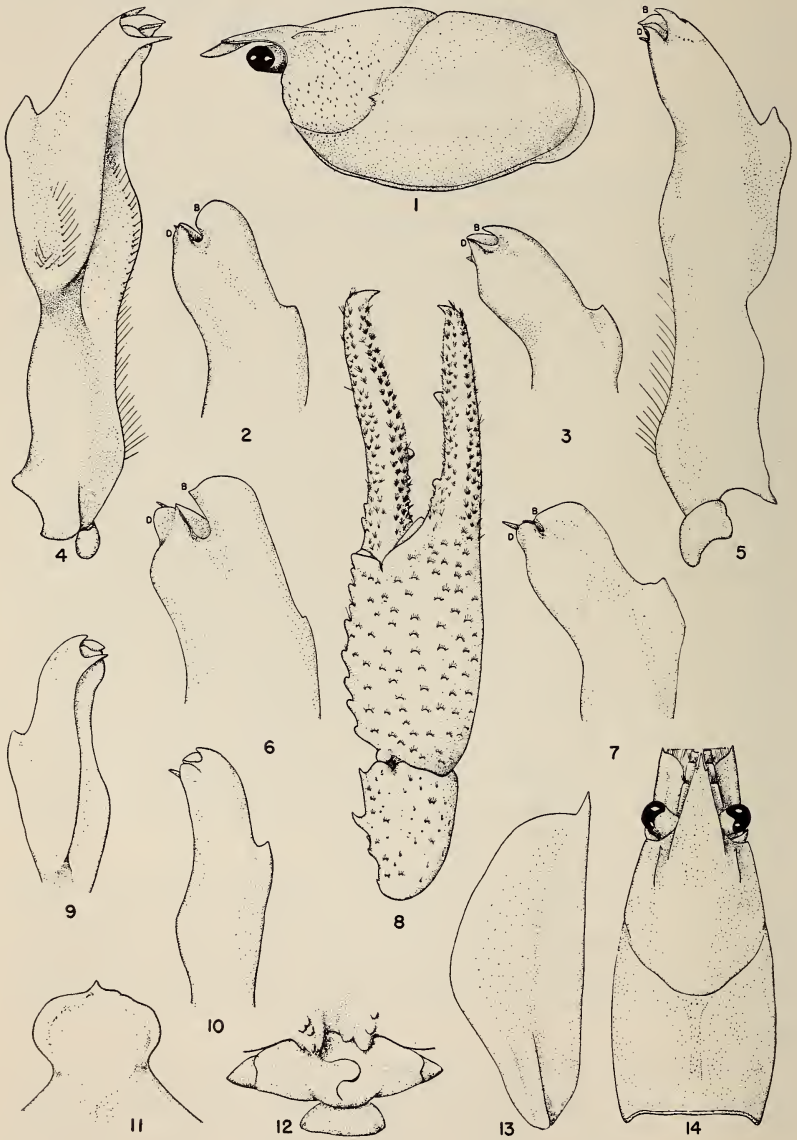
The new species described below is of especial interest because its presence in the Altamaha drainage system partially closes what has appeared for many years to be a gap in the range of the members of the Clarkii Subgroup (Hobbs, 1942: 98).

The apparent gap was located between the range of *P. paeninsulanus* and that of *P. troglodytes*. The former species is known to occur in the following drainage systems of Georgia: Apalachicola, Ochlocknee, Suwannee, St. Mary's, and Satilla; whereas, *P. troglodytes* has been found in the Ogeechee and Savannah rivers. Thus a triangular wedge existed in the southeastern part of Georgia (in the lower Piedmont and Coastal Plain) in which no representative of the Clarkii Subgroup was known. This subgroup of the Genus *Procambarus* consists of the species described below along with four which have been known previously [*Procambarus clarkii* (Girard, 1852: 91), *Procambarus troglodytes* (Leconte, 1856: 400), *Procambarus paeninsulanus* (Faxon, 1914: 369), and *Procambarus okaloosae* Hobbs (1942: 100)]. Although there are a number of features which these species share in common, the presence of a shoulder on the cephalic margin of the first pleopod of the male some distance proximal of the terminal elements is the best single diagnostic characteristic of the Subgroup.

The combined ranges of the group extend from Texas to South Carolina. In the Mississippi basin *P. clarkii* has been collected as far north as Arkansas and southwestern Kentucky; farther east, however, the members of the group appear to be restricted largely to the Coastal Plain, and invade the Piedmont Province in few places.

All five species frequent sluggish to moderately flowing streams; however, as a group they are found more abundantly in lentic situations: swamps, ponds, roadside ditches, borrow pits, and

¹ Contribution from the Miller School of Biology, University of Virginia.



temporary bodies of water. All of the species previously described are known to burrow.

It is with pleasure that I name this new species in honor of Miss Thelma Howell of the Department of Biology, Wesleyan College, who sent me the first specimens I had seen, and who has been most cooperative and helpful in adding a large number of crayfishes to my collection. I also wish to thank Dr. D. C. Scott of the U. S. Public Health Service, Augusta, Georgia for the specimens which he collected in Emanuel and Telfair counties, Georgia.

Procambarus howellae, sp. nov.

DIAGNOSIS.—Rostrum with or without lateral spines or tubercles; areola narrow with two or three punctuations in narrowest part, from 9 to 17 times longer than broad; a single lateral spine present on each side of carapace. Male with hooks on ischiopodites of third and fourth pereopods; palm of chela of first form male not bearded but bearing a row of seven to nine tubercles; postorbital ridges terminating cephalad in spines or prominent tubercles. First pleopod of first form male with an angular shoulder on cephalic surface near base of distal third of appendage, and distal portion terminating in four distinct parts: mesial process slender, non-corneous, and directed caudad; cephalic process blade-like, partially corneous, lies cephalolaterad of central projection and directed

EXPLANATION OF PLATE

- Fig. 1. Lateral View of carapace of holotype, *P. howellae*.
 Fig. 2. Lateral view of distal portion of first pleopod, first form male, of *P. troglodytes* from Liberty County, Georgia.
 Fig. 3. Lateral view of distal portion of first pleopod, first form male, of *P. paeninsulanus* from Bacon County, Georgia.
 Fig. 4. Mesial view of first pleopod of holotype, *P. howellae*.
 Fig. 5. Lateral view of first pleopod of holotype, *P. howellae*.
 Fig. 6. Lateral view of distal portion of first pleopod, first form male, of *P. clarkii* from Aransas County, Texas.
 Fig. 7. Lateral view of distal portion of first pleopod, first form male, of *P. okaloosae* from Covington Co., Alabama.
 Fig. 8. Carpus, propus, and dactyl of cheliped of holotype, *P. howellae*.
 Fig. 9. Mesial view of first pleopod of second form male morphotype, *P. howellae*.
 Fig. 10. Lateral view of first pleopod of second form male morphotype, *P. howellae*.
 Fig. 11. Epistome of holotype, *P. howellae*.
 Fig. 12. Annulus ventralis of allotype, *P. howellae*.
 Fig. 13. Antennal scale of holotype, *P. howellae*.
 Fig. 14. Dorsal view of carapace of holotype, *P. howellae*.

caudodistad (and sometimes somewhat mesiad); caudal element consisting of a caudal process closely applied to the caudoproximal surface of the central projection, and an adventitious ridge-like prominence on the caudal and mesial flank of the caudal process — caudal knob not well-defined; central projection beak-like, corneous, and directed caudad (and sometimes somewhat mesiad).

HOLOTYPE MALE, FORM I.—Body subcylindrical, only slightly compressed laterally; abdomen narrower than thorax (11.7-14.0 mm. in widest parts respectively); width and depth of carapace subequal in region of caudodorsal margin of cervical groove (14.0-14.1 mm.).

Areola narrow, about 16 times longer than broad with two punctations in narrowest part; cephalic section of carapace almost twice as long as areola (length of areola about 33.6 percent of entire length of carapace).

Margins of rostrum converging to base of acumen where there is a small acute tubercle on each side; acumen only slightly upturned at cephalic extremity; rostrum subplane above and without swollen margins, but margins distinctly elevated and flanked mesially by a row of setiferous punctations which continues onto acumen. Post-orbital ridges not prominent, grooved laterally, and terminate cephalad in small acute tubercles; subrostral ridges well defined and evident in dorsal aspect to midlength of rostrum; suborbital angle scarcely discernible; brachio-stegal spine well developed and acute; carapace with a small acute spine on each side. Surface of carapace punctate dorsally and granulate laterally.

Abdomen longer than thorax (31.8-29.7 mm.).

Cephalic section of telson with three spines in each caudolateral corner, the outer one considerably larger than the inner two which are subequal in size.

Epistome subovate, emarginate cephalically, and with an cephalo-median projection; margin elevated (ventrally) and sparsely beset with simple setae.

Antennule with a strong acute spine on ventromesial surface of basal segment.

Antenna extends caudad of base of telson; antennal scale broad with a well-developed spine on outer distal margin; lamellar portion rounded mesially, and broadest slightly proximad of middle (fig. 13).

Right chela slender, with inflated palm; palm studded with

setiferous tubercles on all surfaces. Inner margin of palm with a row of nine tubercles which are only slightly larger than those immediately above and below this row. In addition to other tubercles on lower surface of palm strong conical tubercle present near base of dactyl. Fingers not gaping. Opposable margin of immovable finger with a row of five small tubercles on basal half, the third from base largest; a strong tubercle extends mesiad from lower opposable margin at base of distal two-fifths of finger; otherwise opposable margin with crowded minute denticles. Opposable margin of dactyl with a row of five small tubercles on basal half, the second and third from base largest; a strong tubercle extends laterad from lower opposable margin at distal end of basal third of finger; between and distad of these tubercles are crowded minute denticles. A low longitudinal ridge present on upper surface of both fingers; upper and lower surfaces of both fingers with setiferous punctations as is outer surface of immovable finger and distal three-fourths of dactyl; proximal fourth of dactyl with a few tubercles.

Carpus of first right pereopod about 1.5 times longer than broad with a very shallow oblique furrow; mesial upper, mesial and mesial lower surfaces with tubercles; other surfaces with setiferous punctations. Upper mesiodistal margin with a prominent tubercle, and a large one on mesial surface near midlength of podomere; lower distal margin with two prominent tubercles, one at lateral and one as mesial angle.

Merus of first right pereopod with upper and lower surfaces tuberculate as are also the upper and lower portions of the mesial surface; lateral surface punctate; two strong acute tubercles near upper distal end of podomere; lower surface with a lateral row of 10 tubercles and a mesial one of 22, two in the lateral row are much longer than the others, and the distal one in the mesial row is the largest; a few additional tubercles present between and to the sides of these two rows.

Ischiopodite of first right pereopod with a row of five tubercles along lower margin, and basipodite without tubercles.

Ischiopodites of third and fourth pereopods with hooks; hooks simple, that on fourth opposed by a bituberculate prominence on the basipodite. Coxopodites of fourth and fifth pereopods with accessory prominences: those on fourth swollen and extending

caudoventrally, while those on fifth are smaller, project ventrally and are less inflated.

First pleopods slightly asymmetrical, the left one situated slightly caudad of the right, and reaching coxopodite of third pereopod when abdomen is flexed. Cephalic surface of appendage with a distinct angular (acute) shoulder located near base of distal third of appendage; shoulder on right pleopod appressed against mesial surface. See diagnosis for description.

MORPHOTYPIC MALE, FORM II.—Differs from the holotype in the following respects: Lateral spines on rostrum more prominent; epistome more broadly ovate; cephalic section of telson with only one spine in the caudosinistral corner; inner margin of palm of chela with seven tubercles, opposable margin of immovable finger with only the two large ones, and opposable margin of dactyl with only the three tubercles; lower surface of merus of cheliped with mesial row of 15 tubercles and a lateral row of six; ischiopodite of cheliped with four tubercles on lower surface. The usual secondary sexual differences occur with smaller hooks on ischiopodites of third and fourth pereopods and less well-developed armature of the coxae of the fourth and fifth pereopods. First pleopod with all terminal elements represented and disposed as illustrated (figs. 9, 10). Shoulder on cephalic margin of pleopod not quite so well developed; shoulder on right pleopod more clearly evident in lateral aspect in that it is not so strongly appressed to mesial surface of appendage. (See Measurements.)

ALLOTYPIC FEMALE.—Differs from the holotype in the following respects: Rostrum without lateral spines; epistome broadly ovate with central raised (ventrally) area; inner margin of palm of chela with a row of seven tubercles; opposable margin of immovable finger of chela with three tubercles and that of dactyl with four; lower surface of merus of cheliped with a lateral row of five tubercles and a mesial row of 15, and lower surface of ischiopodite with a row of four tubercles.

Annulus ventralis broader than long with cephalic margin elevated (ventrally) as a broad caudomedian knob-like area. Sinus originates on dextral side of median line near cephalic margin of annulus, makes an oblique S-curve and continues in a broad U-turn to the median line just cephalad of caudal margin of annulus (fig. 12). Sternum immediately cephalad of annulus bearing a number

of large tubercles, several of which overhang (ventrally) the cephalic portion of annulus on each side of median line.

MEASUREMENTS (IN MILLIMETERS).

Carapace:	Holotype	Allotype	Morphotype
Height	14.1	12.5	10.9
Width	14.0	12.5	11.0
Length	29.7	26.1	23.9
Areola:			
Length	10.0	9.0	7.6
Width	0.6	0.9	0.6
Rostrum:			
Length	8.6	6.0	6.8
Width	4.4	4.1	3.7
Right Chela:			
Length of inner margin of palm	9.8	5.0	4.6
Width of palm	7.3	4.2	3.6
Length of outer margin of hand	24.6	13.3	12.9
Length of dactyl	13.2	7.3	7.1

The largest specimen available, a male form I, has a carapace length of 38.2 mm. The smallest first form male has a carapace length of 25.0 mm.

TYPE LOCALITY.—A small spring-fed drainage ditch on the campus of Wesleyan College at Rivoli, Bibb County, Georgia. The ditch leads into a small artificial pond some 30 by 50 feet and about five feet deep, and the overflow from the pond drains into a lake covering about six acres and finally joins other small streams to flow into the Ocmulgee River. Most of the specimens on which this description is based were collected from the ditch between the pond and lake. The ditch is very close to an almost pure stand of loblolly pine (*Pinus taeda*) but along its banks are the following trees and shrubs: *Liquidamber styraciflua*, *Quercus nigra* (predominant species), *Cornus florida*, *Magnolia grandiflora*, *Ilex opaca*, *Prunus serotina*, *Crataegus* sp. Here the water ceases to flow at times so that there are dry areas alternating with pools. At such times the crayfish may be found "in piles of very wet

leaves as well as in the pools". Both *Procambarus spiculifer* (LeConte, 1856:401) and *Cambarus latimanus* (LeConte, 1856:402) have been collected from this stream.

DISPOSITION OF TYPES.—The holotypic male and allotypic female (No. 93158), and the morphotypic male, form II (No. 93159), are deposited in the United States National Museum. Of the paratypes, one male, form I, one male, form II, and one female are deposited in the Museum of Comparative Zoology, and two males, form I, seven males, form II, one female, five immature males, and four immature females are in my personal collection at the University of Virginia. The entire type series was collected in the type locality.

RANGE.—This species has been collected in three localities located in the Altamaha drainage system in Georgia. *Bibb County*.—the type locality: 1♂ I, 1♂ II, February 5, 1941; 1♀, 1943; 1♂ II, February, 1950; 3♂♂ II, January, 18, 1952; 3♂♂ I, 4♂♂ II, 2♀♀, 5♂♂ imm., 4♀♀ imm., March 3, 1952, all collected by Miss Thelma Howell. *Emanuel County*.—Ohoopsee River, one mile east of Adrian, U.S. Hy. 80: 1♂ II, March 25, 1950, D. C. Scott collector. *Telfair County*.—Turnpike Creek, one mile east of Milan on U.S. Hy. 280: 2♂♂ I, 4♂♂ II, March 26, 1950, D. C. Scott collector.

VARIATIONS.—Rostrum with or without lateral spines. Areola varies from 9 to 16 times longer than broad with two or three punctations in narrowest part. Suborbital angle in some specimens moderately well developed. Cephalic section of telson with from one to five spines in each caudolateral corner. Inner margin of palm of chela with a row of from seven to nine tubercles (seven most frequently). Opposable margin of immovable finger with a row of three to ten tubercles and that of dactyl with from four to eleven; however, the number of larger tubercles are as in holotype. Basipodite of fourth pereopod without a bituberculate prominence opposite tip of hook on ischiopodite. None of these variations is correlated with local populations; however, the terminals of the first pleopods of the males from Telfair and Emanuel counties seem to be twisted somewhat clockwise so that the mesial process springs from the cephalomesial angle of the appendage and the central projection is directed caudomesiad.

RELATIONSHIPS.—*Procambarus howellae* has its closest affinities with *Procambarus paeninsulanus*. These two species, occupying

adjacent ranges, (see below) appear to be more generalized members of the subgroup while their more specialized relatives *P. clarkii* and *P. okaloosae* are found to the west and *P. troglodytes* to the northeast. *P. howellae* can be distinguished from its relatives by the laterally displaced, blade-like cephalic process of the first pleopod and by the structure of the annulus ventralis with the ornate sternum lying immediately cephalad of it.

KEY TO THE SPECIES OF THE CLARKII SUBGROUP
(GENUS *Procambarus*)

[BASED ON FIRST FORM MALES]

- 1 Cephalic process of first pleopod consisting of a broad rounded lobe, the caudodistal margin of which may be angular or rounded (Figs. 2, 6, 7) ----- 2
- 1' Cephalic process acute (Figs. 3, 5) ----- 4
- 2 (1) Caudal margin of cephalic process with a distinct angle (Figs. 6, 7) .. 3
- 2' Caudal margin of cephalic process rounded, never with a distinct angle (Fig. 2) ----- *P. troglodytes* (LeConte)
Range: North of the Altamaha River in Georgia and South Carolina.
- 3 (2) Gap between cephalic (B) and caudal (D) processes greater than one-half the width of the caudal process (Fig. 6) ----- *P. clarkii* (Girard)
Range: Texas to Escambia County, Florida, and north to Arkansas and southern Kentucky.
- 3' Gap between cephalic (B) and caudal (D) processes less than one-half the width of the caudal process (Fig. 7) ----- *P. okaloosae* Hobbs
Range: Between the Yellow and Perdido rivers in Alabama and Florida.
- 4 (1') Distal portion of first pleopod bulbous; in lateral aspect constricted immediately distad of shoulder (Fig. 3) --- *P. paeninsulanus* (Faxon)
Range: From the Choctawhatchee River to the Atlantic Ocean, and from southern Georgia to Hillsborough County, Florida.
- 4' Distal portion of first pleopod tapering; in lateral aspect never constricted immediately distad of shoulder (Fig. 5) -----
----- *P. howellae* sp. nov.
Range: Tributaries of the Altamaha River in Bibb, Emanuel, and Telfair counties, Georgia.

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